

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

DEC. 18, 1950

\$6.00
A YEAR



At Truax there are 60 of the latest 180,000 candlepower L-M High-Intensity Lights (right), with L-M's famous controllable beam which eliminates glare. These are installed on the main 6000-foot N-S runway, which will also soon have a new ILS system.

BOB SKULDT of TRUAX FIELD

"Pilots like the controllable beam"

"Our new high-intensity runway lighting is solving many problems for us," says Robert Skuldt, manager of Truax Field, Madison, Wis. "The airport is built on reclaimed swamp land, almost completely surrounded by low hills. The combination gives us lots of fog, especially in spring and fall. Pilots of both Northwest and Wisconsin Central Airlines are enthusiastic about the lights. The controllable beam feature is particularly appreciated. We expect maintenance costs to be much lower than on our old medium-intensity system."

Mr. Skuldt is a pilot himself. He spent considerable time flying the "Hump" in the China-Burma theatre, and is a captain in the 176th Fighter Squadron, Wisconsin Air National Guard, based at Truax.



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**AVIATION
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B.F. Goodrich



100-foot rubber band seals pack and plane together

DURING the new Burchfield Pack plane called for a seal to close up the two-inch space between the cargo pack and fuselage against wind and rain.

Trouble was, ordinary vulcanized seals or compression-type seals wouldn't work. They would put up on a 315-ton separating force on the plane, which is much too much. When's more, the seal would get damaged in positioning the pack for attachment.

B. F. Goodrich engineers were given the job of developing a 100-ton band of rubber that would provide the

weather seal between pack and plane—and at the same time answer those problems.

They started with an inflexible tube, made of rubberized fabric with a felt rubber hose. To the top of this tube they glued a special rubber strip, forcing a lip-type seal which was stretched to the pack.

In flight and ground tests, the new B. F. Goodrich inflatable seal proved the perfect answer. Its deflated height, only 1/4", allows plenty of clearance during attachment of the pack. In inflation it gives 100 times its deflated height, provid-

ing a watertight seal. Because contact with the plane is made by the thin rubber lip instead of the tube itself, separating force is practically eliminated.

If you have a sealing problem—or any other problem that B. F. Goodrich engineering and research might solve—remember that BFG is close with the latest developments. The B. F. Goodrich Co., Akron Division, Akron, Ohio.

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NEWS DIGEST

DOMESTIC

Republic P-64 Thunderbolts have gone into action in Korea, with planes having been turned from the U. S. by carrier and pilots and ground crews going across to MATS transport. Flares are down the 37th Fighter Escort Wing. Ten Forward Airham 134s, the P-64 will provide the first full-scale test of U. S. mid-air engine in combat.

An anti-submarine payment separation bill was passed by House last week and sent to Senate. Bill proposes limiting subsidies to reduce carrying air mail.

Negotiations for sale of Airborne Instruments Laboratory have begun. Negotiation last week. Prospective buyers are a group of executives and employees of Airborne, Lawrence Rockefeller and some of his associates, and the American Research and Development Corp. of Boston. The deal would share nearly equally in ownership of capital stock which is being acquired from Aeromarine Radio Inc. Major R. Blaker would continue as president and general manager of Airborne.

Bel Aircraft's modified B-50, to be used for testing later models of the supersonic X-1, was flown away from the company's plant by USAF Maj. Frank E. Evans who made 10 flights in the X-1.

Convair B-10F, a new and more powerful model of the USAF's longest ranging bomber is now being flight tested at Ft. Worth. The plane has 3000-hp Pratt & Whitney T57 engines, a development of the 1950 Whap Motor power the B-10F. USAF has placed orders for the new B-10F.

Sheldon B. Stew, former director of aviation in Michigan and well-known aviation figure, died of a heart attack.

Second wage increase agreement signed by American Airlines and CIO Transport Workers Union possible four-month-late raise may rise for three years for AA's approximately 100,000 maintenance and ground personnel, retroactive to Dec. 2. Included is a cost-of-living schedule clause to be adjusted quarterly, granting two cents hourly for each 2.5% points increase in the Bureau of Labor Statistics index. The retroactive payment is to be made Jan. 1. The rate will also grant the wage benefits to the line's 3500 employees not covered under union agreements. After Dec. 2, AA's wage scale for mechanics will be \$2.10 hourly, for lead mechanics \$2.95, senior mechanics, \$1.94.

R. W. Richardson, manager, Aviation Products division of Goodyear Tire & Rubber, has been elected president of Aviation Distributors & Manufacturers Assn. George W. Johnson, III, vice president sales of Southwest Aircraft was again elected vice president and E. W. Giers, vice president of Hamilton Magenta was elected vice president.

First production F102 Rockwell has been delivered by Douglas to Navy Composite Squadron VFC-1 at Moffett Field. The big all-weather fighter carries 1000 lb of extra. Production design started in 1945.

Losses losses of jet fighters compared with piston-engine fighters operating in Korea are indicated in a comparison of the F-51 and F-56, showing losses through Oct. 31. F-51 has flown 12,000 or 94 percent of the sorties, the F-56 has made 15,500 (96 percent). Losses from all sorties show the F-51 suffered 69 losses (62 percent), the F-56 suffered 42 (74 percent). Losses due to enemy ground fire were F-51, 34 (75 percent); F-56, 11 (24.5 percent).

Personal and executive plane reports for October totaled 86 craft valued at \$239,597, ATA reports for more member companies.

FINANCIAL

Westinghouse Electric Corp. shows an operating profit of \$55,496,723 on net sales of \$755,623,165 for nine months ended Sept. 30. Net income per common share, after taxes, is \$3.37.

Consolidated Aircraft Co. reports \$327,652 net profit on sales of \$7,138,493 for year ended Sept. 30. Earnings dropped from 1949's \$299,936, as a result of 45 percent drop in unit volume.

INTERNATIONAL

Pratt & Whitney 12-cylinder has gone into service for Brazilian Frederick, Engstrom & Thompson's Avian North-Brazil Ltd. The firm will connect Clark state with the capitals of Para, Maranhao and Bahia states.

Schweiss DC-4 crashed on final approach to landing at Sydney, New South Wales, with preliminary reports indicating destruction of the aircraft but no fatalities among the crew or 20 passengers. The plane was scheduled to land at Caswell, but was diverted to Sydney because of weather.



CP Hot Dimpler 450-EA

for hot dimpling

of magnesium and the harder aluminum alloys

In dimpling magnesium and the harder aluminum alloys, the application of heat is recommended to eliminate cracked dimples.

Developed for this type of work, the CP Hot Dimpler incorporates Zapher heat edge dimpling punches and dies which insure accurate setting of dimples. Write for detailed information on the new CP-450-EA hot dimpler.

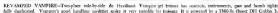


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AVIATION WEEK, December 18, 1955



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Washington Roundup

\$15 Billion for USAF

Department of Defense budget for 1972 fiscal year is now pegged at \$50 billion, but this is highly tentative depending on international developments. It would mean over \$15 billion for USAF. USAF's piece of the \$40.5 billion for the armed services for the current year including the \$16.6 billion additional now pending in Congress is \$27.9 billion. Naval Air's share \$17 billion. The \$40.5 billion is all the services will be able to spend efficiently. Secretary of Defense George Marshall reports.

\$100 Billion for Defense?

Prospects for a \$100 billion defense program would include up to \$25 billion for European arm and missile forces discussed among State and Defense Department officials. But it's not unless the U.S. is attacked into a major war with China, which is unlikely. While nations include Russia, not China, is the No. 1 enemy. But it would be catastrophic to allow a wholesale desertion of military strength in a secondary conflict.

Services' strength

Meanwhile, USAF is second in strength of the three services in manpower to last. The \$15.8 billion that will go to USAF this year compares with \$15.4 billion for Army and \$18.7 billion for Navy. Under the program for an armed services strength of 2,770,000 by next June, 1,344,000 will be in the Army, 355,000 in Navy—only 651,000 in USAF.

JCS Choirmanship

Col. Oscar Benfield's resignation of Air Force Staffing to accept him at the London mission of the Military Committee of the North Atlantic Treaty organization has increased speculation that Sherman will now head Benfield at the defense of the Joint Chiefs of Staff. Benfield's term expires next August. It is understood he doesn't want to move another two-year term.

McNeil's misinformation

Plane engine manufacturers are said to be irritated over Assistant Secretary of Defense William McNeil's report to a closed-door session of the House Armed Services Committee that the air is holding up aircraft production by late delivery of engines on an engine-to-airframe basis. It brought a protest at the session from the Committee's Chairman Carl Albert who said they should be on record the clock engine. Minutes later and he was glad to receive information that most engine manufacturers are working two or three shifts—and that the only companies working the 40-hour week are doing so simply for lack of orders.

NACA Build-up

NACA will add 600-1,700 members, plus expanding personnel to fill in the next future. One of the \$1 million supplemental asked for by NACA to hasten the stepped-up research and development programs of USAF and Navy. \$2.5 million is for new facilities at Lewis Laboratory.

Security Slip-up

Confidential aeronautical information from NACA was found on the sidewalk of Washington by a sportsman who promptly published the story. An investigation by NACA developed that its dispatching room was discussing selected sheets of confidential documents in trash baskets for garbage collection. Some of these were blowing away. The committee has ordered that all trash from its dispatching room be directly sealed for burning.

Civil Air Mobilization

New Civil Defense Administration may purchase planes, special training of pilots for emergency duty in the event of a bombing attack. The program now being passed out of the House is a \$300 million expenditure—operated by CDA, and studies for execution, including transportation, equipment. Legislation gives legal sanction to establishment of CDA—now operating by executive directive—informs it to expand training programs for all types of emergency work. Congress hopes to pass the measure and appropriate funds possibly around \$80 million, before the year's end.

Transportation Tax Boost?

An increase in the 15 percent tax on passenger traffic may come next year. The new Congress, however, in June, may not act to work promptly on legislation to raise additional tax revenue across the board. But most of the additional taxes "will have to come through increases in income and estate taxes." Chairman Walter George of the Senate Finance Committee reports. A side objective: to discourage flight as stepped up defense reliance on air means. Traffic Outlook is good for prompt legislation compelling federal level of services from the transportation line. It already has passed the House.

War Risk Insurance

Governance measures for airlines whose operations for the armed services include war risk will go through Congress shortly, after the year of the industry and government are generally agreed on a draft of a bill. Similar legislation concerning the war risk requirements of the Merchant Marine was enacted in August. Airlines didn't meet government insurance in the last year because the planes they operated were government-owned.

Flying van?

Tarrant Van Corp.—under a tight cloak of secrecy—is developing a flying van that can land vertically or take off. The Redford City, Calif., firm is headed by former Assistant Secretary of Commerce for Air, John Albright.

The principle is similar to that of the Fairchild C-119, in which the tail, by hydraulic lift, is attached to the plane. The van would attach to the underbelly of the plane, drop off when the plane landed. Its capacity would be four truckloads, compared to the pack plane's one truckload. It holds forth the prospect of mail and cargo shipments at a 10-cent-a-mile rate. This could mean that a substantial part of the \$100 million a year mail business—94 percent of which now comes by rail—would shift to the air.

AVIATION WEEK

NOV. 23, 1959

DECEMBER 18, 1959

Congress Questions Contract Slow-Down

Investigation may ask why USAF decides what planes to buy, but doesn't order.

By Ron Lee

Congress is becoming impatient with the slow commitment of funds for aircraft by USAF procurement officials after delay predictions before Congress in what would happen to the national safety if funds were not immediately applied.

While Air Force officials guard procurement contractor procurement data under a cloak of "security" the industry and interested public are surely aware in general of actual contracts.

An House officials have previously stated that funds for all airplanes and engines have been allocated. Actually, only about 75 percent of the \$41.1 billion USAF has for procurement is now allocated.

Investigation Ahead—Congressional sources have told Aviation Week that "procurement procedures of the Air Force are going to be looked into shortly after the first of the year." (This probably will come as part of the investigation into Army USAF procurement in general support matters.)

Nearly three months ago Air Force tentatively dropped out of a joint evaluation of aircraft aircraft at Randolph AFB, Tex. Personnel of the Air Force was to study USAF and Navy to come up with a joint set of specifications for an ideal fighter for use by both services and probably U.S. allies.

The reason USAF dropped out of the evaluation was immediate requirement of Air Training Command for fighter aircraft. As a result, the Congressional source said, USAF fears a "quarrel" between of fighter aircraft involved and made a decision indicating the Fairchild T-11 as nearest to requirements. But this effort is no order out, despite its request was by ATC for training planes (Aviation Week Dec. 11).

Meanwhile, Congress has been delayed quarterly. Aircraft transports to fill a current and vital role for Army are still not on order, the spokesman said. Evaluation of current models is underway by Navy (C-119, Fairchild C-119 and Chase XC-121 and YC-122, delayed four years this year and finally cancelled at Eagle AFB, Pa.) has been completed and decided in favor of the Chase XC-122. There has been no reduction of proposals to

order despite the fact that Chase has already leased a plant at Birmingham and moved only one plant right.

Fairchild Engine & Airplane Co. Air Force sources have told Aviation Week, is being asked for preliminary cost estimates for two prototype aircraft transports. Despite heavy slow-down for C-119, which is working in military circles is that the same month from production may be due for another series next spring, regardless of current international issues.

Fighter-Engine contracts are still left up in the air. Recent evaluation of language about fighter planes at Edwards AFB, Calif., signed by the McDonnell XF-85, the Lockheed XF-90 and the North American F-95, was cancelled and delayed. The McDonnell XF-85, No fighter contract has resulted from the Marine chairman.

Kaiser Bids for C-119 License

A proposal by Henry J. Kaiser to purchase the Fairchild C-119 Packard under license in the Willow Run plant, automobile plant apparently is being studied by the Air Force.

Kaiser's interest in aircraft production, in which he moved in World War II and immediately thereafter left his share of his company at shipbuilding, was tracked off by the terms of a recent Boeing aircraft Finance Corp. loan to his automobile company. In return for the \$25-million loan Kaiser had to agree to cut his auto production and devote to defense work the facilities that had.

He then approached the committee of L. G. Gray, K. R. Wall, USAF deputy Chief of Staff for Materiel, in Washington as officers on Wall's staff telephoned Fairchild's headquarters plant on Monday to see if Kaiser would be in. The answer is no. Gray said that the purpose of the visit was to discuss the C-119 license system.

Fairchild's Office—Fairchild says—has been proposed to the Air Force that it take over the Willow Run plant in Chicago to produce Packards. The production rates in

Helmington—Helmington contracts are also being held back in many instances because of the obscurity in the Air Force government program, American West learns. While no official contract could be obtained, unofficial sources stated that the entire contract of helicopter and fuselage, mainly, for the C-119, was not yet in production.

Fighter Bomber—USAF recently has no non-light bomber types on order although there is an urgent requirement for that category. It has ordered and considered evaluation of several light bombers including the Martin XB-12, the British Merit II Canberra and the North American B-45. Of the latter, approximately 150 are now being for USAF and the plane is out of production.

The Martin XB-51 considered by Army to be the heaviest of the light bombers for ground support missions, is still not on order despite USAF Materiel contract signed for production of the plane is to be required.

Production of the British Canberra is

not proposed with the same figure that Kaiser in his bid, at Englewood, is to be the first series at the Willow Run plant.

Fairchild and other aircraft industries affiliate with the Kaiser offer are disturbed over the interpretation. They point out that there is a small amount of production capacity—such as the Chicago plant and the World War II B-29 plant at Marietta, Ga.—that is not needed by current programs.

These aircraft officials told the view that higher production can best be obtained by using the know-how of contract companies to expand—no one does in World War II—have modernized, even so, matter how influential people are brought into the field.

Washington officials also pointed out that if emergency contracts are to be made, it would be up to the Air Force rather than the industrial companies to take the initiative. It is also up to the Air Force to make known to manufacturers which license systems it knows. Approval by the private manufacturer for license to produce Air Force planes for the Air Force firm becomes merely a formality.



\$70,000 was awarded by North American Aviation to the lengthy Gessard rolling machine to cut wing spars for jet fighters. This is typical of the capital being put into hardening production lines.



\$410,000 was spent by Sikorsky for the 500-ton Elm hydraulic press. Considered a giant press then, this machine is dated by the new . . .

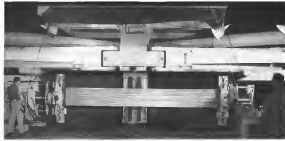


\$750,000 Bellanca 300-ton hydraulic press, also in stock's conception, which was ordered the year by Lockheed. Note small size of scale figure.

Massive Tooling Marks Industry's Defense Program

U.S. aircraft production lines are undergoing a tremendous and costly reorganization to meet the huge wartime aircraft program and rising of the world's worsening political situation.

The manufacturing picture is further complicated by the need for far more intricate processing machinery necessary to handle tougher materials, the new shapes and sizes and increasing reliance in modern and complex high-speed military aircraft.



\$318,000 Modified stretch press is used by Lockheed to fabricate an amazingly stiffened aluminum alloy extrusion. The machine can also be utilized in forming wing skins, struts, and beams.



\$250,000 was bill for the 700-ton hydraulic press rubber pad forming tool for Boeing-Stearns.



\$80,000 Cyril Bell Rotoformer has been put in use by Boeing-Stearns to bend aluminum or magnesium parts in semi-circular or circular shapes.



\$155,000 was the total bill for this 90-ton Malmgren tube rolling machine used by Hamilton Standard on hollow steel blade production.

The more than \$5 million program for new plant and equipment of North American Aviation and the \$15 million outfit being handled by Lockheed are typical of the gains the industry is spending to update its technology to handle the increased expansion.

Shown on these pages are some of the great machines on order and on use by the industry, and their joint tags. They copy what AIA President Adm. D. C. Ramsey recently called, "a new cycle of progress in manufacturing methods."



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Completely constructed RF, power supply, and modulator components of new design are available for integrating in different combinations, forming finished transmitters to fulfill all requirements of ground-to-plane, short-haul and point-to-point systems. The frequency range of these transmitters is 2 to 30 megacycles.

RF units can be supplied with or without Autotune control. Manual-tuned RF units may be modified in multiple to provide a multiplicity of fixed-tuned instantly-selectable channels or instantaneous transmitters on two or more frequencies.

Among the combinations available are the Type

451D one kilowatt, ten channel CW-FSK and phone automated transmitter illustrated here. It is made by combining a 507A-1A RF unit, a 506A-1 power unit, a 506A-2 power unit, a 506A-1 modulator unit, a 3-day cabinet and a 1 KW blower.

Another combination, not illustrated, is the Type 434B 1 one KW, two simultaneous-channel CW-FSK only, manual-tuned transmitter, which is made by combining two 507A-1A RF units, two 506A-1 power units, a 506A-1 power unit, a 3-day cabinet, and a 1 KW blower. Several other combinations are available, one of which is certain to satisfy your exact needs.

Final assembly and testing may be accomplished in the Collins plant or at the installation site. We will be glad to give you details about the 430 series transmitter to fulfill your own requirements.

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1. THIS TOOL (HARDENED S.S.) IS CUTTING A
2. CUTTING SPEED (S.F.M.) IS 250
3. TOOL LIFE (MIN.) IS 100
4. TOOL LIFE (HOURS) IS 100/250 = 0.4

and machinability are clear. And a more hazardous task can be first provided all the information required to act up accurately a metal cutting operation where the work piece is one of the toughest alloys.

The well-known microhardness test of Rockwell tests over a wider range of hardness than can be obtained by other methods and are not subject to a true picture of tool hardness due to minute variations within. These last "hard spots" may appear in tooling calculations on high-temperature alloys.

Microhardness tests are coming into wide use. These provide readings of microhardness points to determine the hardness of specific microconstituents. Before tests, each face integral with copper to examine etched and polished specimens which locate the exact spots where hardness readings are desired.

Indentations range in length from 1 to 100 microns (one micron is 0.001 mm.) and loads applied can be varied from 10 to 10,000 grams.

► **Structure Examined**—A chapter entitled, "Metals Under the Microscope," discusses effectively the microstructure of wrought steel, cast iron and, more importantly, high-temperature alloys. The common constituents of the well-known alloys are given and given with as illustrated in a reference treatment for those who are not completely up-to-date on metallurgy.

High-temperature, corrosion-resistant alloys receive special treatment since their carbide constituents behave differently. These alloys behave differently from steels and cast irons and usually are subject to solution treatment, and later age (precipitation) hardening and work hardening. Aging increases precipitation of the carbides. This, in turn, affects machinability and tool life.

Testing of machine tools was a major part of the research program. High speed, high power and automatic operation are important advantages of new production machinery. But these advantages demand a high degree of machine perfection to stand against loads—both rotating and reciprocating.

Machine tool vibrations were analyzed and traced to their source. Stress analysis received some attention, although only in the case of failure. No basic design studies were made.

► **Cutlery**—Tool—Natural carbide tools have brought about a revolution in production. These extreme hardness and high strength, even at high temperatures, permit production increases on the order of 50 percent.

It would seem that such performance indicates a problem and complete switch to carbide cutting tools throughout industry that it must be remembered that machine tools must be redesigned to accurately handle carbide, greater strength and much more power to make the new techniques effective.

Furthermore, the carbides demand a new technique in application. They themselves have been improved steadily over the past 15 years.

The choice of carbides is difficult because composition rate vary, even where equivalent grades are specified. Produced by powder metallurgy, carbide composition may vary for mechanical and chemical properties—producing many combinations of physical properties.

► **Carbide Properties**—Thermal expansion of carbide is one-third that of steel. Thermal conductivity is double that of steel. It has a low thermal



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It's this extra endurance which delivers the added hours per replacement and which explains why Packard cable is now successfully used in all types of planes, at all altitudes, under all atmospheric conditions—anywhere.



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REPRODUCTION BY PERMISSION OF THE NATIONAL ARCHIVES

Weighing the Air...in Inches

Taking the measure of atmospheric pressure dates back to Torricelli's mercury column in 1643.

Subsequently, the aneroid—or barless—barometer was developed. But while it offered a much higher degree of portability, there was also a corresponding sacrifice of accuracy.

In fact, not until the advent of the first sensitive altimeter—engineered by Kollsman—was the aneroid diaphragm recognized to be an extremely reliable gauge of pressure differential.

The pointer of the Kollsman 80,000-foot Sensitive Altimeter accurately indicates a change of fifty feet while the positive diaphragm movement is only one one-hundredth of an inch.

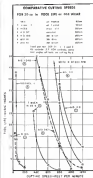
This outstanding example of precision engineering and careful manufacturing technique typifies Kollsman leadership in the fields of aircraft instrumentation, optics and electromechanical controls.

KOLLSMAN AIRCRAFT INSTRUMENTS

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strength and fracture under shock loads. Though extremely hard, carbides may crack or gall under high pressure, high-speed contact of a frictional type.

Comparison of strength is difficult. Breakage frequently is caused by an improper tool design. In carbide the subject is the toughest and the hardest most brittle.

In the search for the best high temperature alloy cutting, the carbide tool has been found to be best.

► Carbide from Grade K-1000-Cut, an alloying grade, is superior to steel-cutting grades which had been previously used, but which afforded comparative short tool life.

As expected, great variation in machining are found critical in alloys for aircraft gas turbines.

Various bucket alloys proved to be the greatest machining problem. Carbide-alloy bucket blades are tougher but are more difficult. The turbine rim is midway in machining difficulty, between bucket materials and conventional stainless steels. Special rings and compressor parts are of stainless steel.

These alloys present a high shear strength in cutting tools and have a tendency toward rapid work hardening during cutting operations. Their steel base becomes highly abrasive to conventional cutters and tools.

Turbine bucket alloys are so unlike other engineering materials that some of the present carbide cutting tools are entirely useless. The bucket alloys have a tendency toward galling, severe



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SOLVES MANY REMOTE CONTROL PROBLEMS

The many production applications of LEXED Rotary Solenoids vary from the dependable, snap-action tripping of airborne bombs to the accurate opening and closing of valves in heavy-duty automatic handling equipment.

Even LEXED Rotary Solenoid models are manufactured. Distances range from 1/4" to 7/16" inches. Professional installation up to 99° can be engineered to meet your product's requirements. Strong magnets for 400" stroke range from 1/4" pound-inches to 30 pound-inches. We supply in quantity each and each the opportunity to be of assistance in engineering a LEXED Rotary Solenoid to meet your product's requirements.

MODEL NO.	STROKE	WEIGHT	TRIP WEIGHT
1000	1/4"	1.0	1.0
1001	1/4"	1.5	1.5
1002	1/4"	2.0	2.0
1003	1/4"	2.5	2.5
1004	1/4"	3.0	3.0
1005	1/4"	3.5	3.5
1006	1/4"	4.0	4.0
1007	1/4"	4.5	4.5
1008	1/4"	5.0	5.0
1009	1/4"	5.5	5.5
1010	1/4"	6.0	6.0
1011	1/4"	6.5	6.5
1012	1/4"	7.0	7.0
1013	1/4"	7.5	7.5
1014	1/4"	8.0	8.0
1015	1/4"	8.5	8.5
1016	1/4"	9.0	9.0
1017	1/4"	9.5	9.5
1018	1/4"	10.0	10.0
1019	1/4"	10.5	10.5
1020	1/4"	11.0	11.0
1021	1/4"	11.5	11.5
1022	1/4"	12.0	12.0
1023	1/4"	12.5	12.5
1024	1/4"	13.0	13.0
1025	1/4"	13.5	13.5
1026	1/4"	14.0	14.0
1027	1/4"	14.5	14.5
1028	1/4"	15.0	15.0
1029	1/4"	15.5	15.5
1030	1/4"	16.0	16.0
1031	1/4"	16.5	16.5
1032	1/4"	17.0	17.0
1033	1/4"	17.5	17.5
1034	1/4"	18.0	18.0
1035	1/4"	18.5	18.5
1036	1/4"	19.0	19.0
1037	1/4"	19.5	19.5
1038	1/4"	20.0	20.0
1039	1/4"	20.5	20.5
1040	1/4"	21.0	21.0
1041	1/4"	21.5	21.5
1042	1/4"	22.0	22.0
1043	1/4"	22.5	22.5
1044	1/4"	23.0	23.0
1045	1/4"	23.5	23.5
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1050	1/4"	26.0	26.0
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1057	1/4"	29.5	29.5
1058	1/4"	30.0	30.0
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1060	1/4"	31.0	31.0
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1069	1/4"	35.5	35.5
1070	1/4"	36.0	36.0
1071	1/4"	36.5	36.5
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1074	1/4"	38.0	38.0
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1078	1/4"	40.0	40.0
1079	1/4"	40.5	40.5
1080	1/4"	41.0	41.0
1081	1/4"	41.5	41.5
1082	1/4"	42.0	42.0
1083	1/4"	42.5	42.5
1084	1/4"	43.0	43.0
1085	1/4"	43.5	43.5
1086	1/4"	44.0	44.0
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1089	1/4"	45.5	45.5
1090	1/4"	46.0	46.0
1091	1/4"	46.5	46.5
1092	1/4"	47.0	47.0
1093	1/4"	47.5	47.5
1094	1/4"	48.0	48.0
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1099	1/4"	50.5	50.5
1100	1/4"	51.0	51.0
1101	1/4"	51.5	51.5
1102	1/4"	52.0	52.0
1103	1/4"	52.5	52.5
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1120	1/4"	61.0	61.0
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1123	1/4"	62.5	62.5
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1128	1/4"	65.0	65.0
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1189	1/4"	95.5	95.5
1190	1/4"	96.0	96.0
1191	1/4"	96.5	96.5
1192	1/4"	97.0	97.0
1193	1/4"	97.5	97.5
1194	1/4"	98.0	98.0
1195	1/4"	98.5	98.5
1196	1/4"	99.0	99.0
1197	1/4"	99.5	99.5
1198	1/4"	100.0	100.0
1199	1/4"	100.5	100.5
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and crushing of the tool. It is that kind of new, more balanced, centered-outside tool should be developed for these special requirements.

► **Heat Treatment Helps**—An important aspect of manufacturing operations should make it possible to do it all the major machining on the work while it is in the solution heat treated form—such a measure of heat left for final grinding.

The important turbine bucket alloys, Inconel X and S-816 are machined best by solution heat treatment and the cast iron grade of cutting tool used for operations should be between B03 and 014 in that cutting speed

for best tool life is approximately 90 fpm. This is low for outside machining on standard engineering, but much better than has been possible on these high temperature alloys.

There were two on materials at elevated temperatures (up to 1000 deg. F) for softening of the carbides after any possible grain.

► **Drill Strides**—The research program also included drilling studies on 17 inches alloy 16-25-6, steel on turbine disc fabrication was obtained on drill life and the various factors which could be introduced to improve production. Drill results and design are discussed.

The book concludes with five chap-

ter on the microstructure and its desirability of steel and cast iron.

Machinability approach has gone a long way to put metal working on a truly scientific basis. It also points up the need for several specific carbides and improved machine tools in general.

These approaches involve increased capital outlay in most cases but hold forth the best of sharply increased production, lower cost parts and achievement of a precise, balanced, in the nature's delicate schedule.

The full report is available from Crane-Wright Corp., Wood Ridge, N. J., for \$2.95.



Navy Device Teaches Ejection Bailout

Keeping pace with the increasing need for training opportunity, the Navy Special Devices Center at Sands Point, New York, has developed equipment to simulate the pilot with ejection seat bailout procedure.

This ejection seat trainer now is being evaluated at the Naval Air Materiel Center at Philadelphia, Pa. It simulates a complete ejection sequence by a 17-inch cartridge and ejection seat 20 ft. up a tower at approximately 60 mph.

The setup is built around a reproduction of a Grumman F7F Panther cockpit and uses a Navy pilot seat.

► **Operation**—First action of the trainer is to pull a three-cartridge, firing line to set timer with his head in descent line with his eyes. Pulling the cartridge could the gun mechanism attached to the back of the seat.

The trainer's safety belt is provided with an electrical connector in a safety, mount. In series with the connector is the instructor's pushbutton. First push on the button disengages the safety device on the belt. Second push fires the mechanism and catapults the seat upward with a force of about 15G.

This top force lasts for only 1/100 sec., so that there is no danger of the pilot backing out. For the rest of the



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top be stored down gradually by gravity, are resistance and friction.

► **Controls**—The unit has a 2-ft. safety displacement under control of a spring-loaded fracture bolt. Two independent breakers slow the reel and stoppage is by hydraulic-governor lock.

The training rig also includes a panel of red lights tied in with procedure each light going off automatically with the numerous phases of the operation, allowing the instructor to be relieved about 20 ft. from the trainer and control check-out before releasing the reel. Another feature is use of soft rubber pads that absorb a kick if the trainee catches them with improper body attitude.

In the event of an overhauling, automatically charged battery slow stop of the rig outdoors as well as in a hangar.

The trainer was devised as a result of experiments with a 205-in. steel tower originally developed at the Martin Baker plant in England, but unlike that rig, can be folded quickly and transported on trailers.

Optical Torquemeter

The measurement of jet engine compressor/turbine shaft torque calls for accuracy of ± 0.5 percent at shaft speeds as high as 15,000 rpm.

Remember John J. Reberke, Jr., at

NACA's Langley Flight Propulsion Lab, Langley, Cleveland, has designed an optical torquemeter for gas turbine shafts. It has an reflecting system which requires no physical connection to the shaft under test.

Dynamic tests of the torquemeter were made over a range of shaft speeds from 6,000 to 15,000 rpm, and torque loads from 230 to 1500 in. lb.

► **Accuracy Shown**—The tests showed that the optical type can be used at high engine speeds with acceptable accuracy. Operational principles are simple and the collimator used is non-vibrating. Installation and scale calibration are relatively simple.

But finally has been expensive in fabrication of means to close tolerances, in addition to some minor size chemical problems. Also, it is difficult to take accurate readings of the stress waves. A 6-in. pressure has been replaced, but it was still necessary for personnel to get close to the rotating shaft under test—a prominent vulnerability for safety reasons.

Effect of Ice on Prop Performance

There has been considerable disagreement concerning the percentage of performance loss attributable directly to icing of propeller blades. Generally the propeller loss has been listed for a power loss from 10 to 20 percent.

Long term investigations by NACA's Ames Aeronautical Laboratory show that efficiency losses usually can be expected to be less than 15 percent. Maximum losses—measured empirically—may be as high as 15 or 20 percent.

Losses frequently have been reported greater than 15 or 20 percent, as a result of reduction in engine performance. But NACA finds that most of that have been the result of ice build-up on other portions of the aircraft.

These investigations were carried out during the winter of 1946-47 and 1947-48. Data revealed were obtained by flights over most of the U. S.

The aircraft employed was a Cessna C-40 type. Thermal antif icing equipment was provided for wing and tail surfaces and the windshield. Electrically heated blades were used on the propeller of the left engine.

The right engine and propeller were used for purposes of icing research.

Carl B. Neel, Jr., and Loren G. Bright of NACA, in Tech. Note 2115, present the results obtained and also include an analysis to establish the magnitude of efficiency losses to be expected under various icing conditions.

The tests also showed that the amount of blade efficiency loss can be reduced by the added ice adjusting engine and propeller controls.



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America has set an amazing record of progress in 50 years—but a moment in the history of civilization. A record unequalled by any other political or economic system.

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And here's another phase of the miracle that went hand-in-hand with these and the myriad of intertwined technological advances—ranging from the radio telephone and Bakelite to the X-ray tube and telemetry . . . and to atomic energy and its untold potentialities.

- ★ Since 1900 we have increased our supply of machine power 4% times.
- ★ Since 1900 we have more than doubled the output each of us produces for every hour we work.
- ★ Since 1900 we have increased our annual income from less than \$1400 per household to about \$4000 (in dollars of the same purchasing power), yet . . .
- ★ Since 1900 we have cut 18 hours from our average work week—equivalent to two percent average workdays.

How did we do it? The basic cause for this composite miracle has been the release of human energy through FREEDOM, COMPETITION and OPPORTUNITY. And one of the most important results is the fact that more people are able to enjoy the products of this free energy than in any other system the world has ever known.

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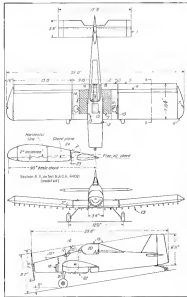
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Spray Plane

Designed-for-purpose
agricultural aircraft
makes first flight.

The first flight, on Dec. 3, of the experimental agricultural plane Ag 1, marked the successful debut of this designed-for-the-job sprayer, duster, fertilizer and insecticide-developed and constructed in the last nine of one year at the Personal Aircraft Research Center of the Agricultural and Mechanical College of Texas.

A comprehensive analysis of the plane appeared in the Oct. 9 issue of *Aviation Week*.

C. W. Von Rosenberg was at the controls on the plane's first flight, taking off in a 50 mph wind. Two intercepts were made, each described as being very short, and made without flaps. According to observers, "handling in the air was satisfactory, but no extremes were used."

The accompanying photo, taken soon after the prototype was rolled out of the hangar, shows the external stiffening extending from the fuselage to the rear of the cockpit; the stiffest would stay down the 15 deg. nose, substantial overhang structure, back wing to provide spray tank storage and high lift, simple tip fairing, and wide track.

Latest details of the aircraft, along with conventional details, are specified on the three-view. 1, Removable air intake; 2, step; 3, flap; 4, walkway; 5, antenna; 6, slot lip; 7, windshield and mounting point; 8, removable wing tips; 9, blunder roll over tank; 10, filler and access door; 11, air vent; 12, fuel gauge; 13, gasoline filler cap; 14, spray tank; 15, dust hopper; 16, hopper door (open); 17, fuel tank; 18, cooling air outlet; 19, rear deflector; 20, spray nozzle; 21, spray edge loading gear; 22, dust appendix (propeller); 23, spray nozzle; and 24, spray manifold.



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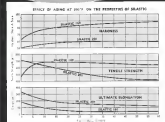
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Silastic is being widely used at temperatures in the range of 250° to 800° F. and at temperatures ranging from -75° to below -100° F. It shouldn't be called a rubber because that term implies comparisons that are not valid. At most temperatures, the physical properties and structural resistance of Silastic are well below the values normally associated with rubbers. Conversely, at temperatures well within the serviceable limits of Silastic, rubber rapidly becomes a soft gey or a brittle solid.

The important thing about Silastic is that it retains its physical, chemical and dielectric properties over a temperature span of about 600 Fahrenheit degrees. When you need rubbery properties or good dielectric properties in a resilient and flexible material at temperatures beyond the limits of ordinary rubber, investigate Silastic.

some stresses concentration elsewhere. Life will usually last until and until short down at only a slight decrease in specific modulus (compared to specific modulus).

► **Shutdowns**—If the shutdown of the engine is intentional or activated by the emergency shutdown system, an air start can be accomplished by the pilot. Only one cylinder is started or shut down at a time to keep hydraulic surge and pressure to a minimum.

Generally, the engine is shut down before propeller clearance. After start, the pilot informs the remainder of the propellers, one at a time to decrease the chance of external ignition. Both tanks are then vented, but no purging is attempted at this time because the purging agent—air—is expelled through the vent valves.

At the end of powered flight, the X-1 glider is its landing and waits for a specially equipped tug to come and get it. It is towed back to the runway area to complete the last phase of the pumping operation.

After the tank and line purging, the engine is thoroughly dried and cleaned internally. All the water should now be removed from the system to reduce corrosion action. All valve parts are inspected and the cylinders are checked for leaks or burnouts. Where possible, oil analysis have been reported in maintenance flight, a pressure check similar to the one for aircraft is conducted.

► **No Accidents**—The search is for the maximum of the first scheduled flight on the Bell X-1 (Aviation Week, Dec. 22, 1947). The recovering rates have been an extensive flight test program carried out on the engine and engine.

It is a high tribute to the plane team (engineer, designer, designer, designer, Inc. and Bell Aircraft Co. that in these five years there have been no serious accidents. And this is with a fuel system with an explosive potential about equal to that of its own weight in TNT.

Plastic Takes Shocks

Outstanding shock resistance is accorded to a new plastic developed by the Chemical division of General Electric's Chemical department at Pittsfield, Mass. Special impact tests, utilizing the repeated dropball method, were conducted to get an approximate indication of the resistance of the new rubber plastic compounds.

Various Gels, composed of plastic products for the Chemical division, stated that when subjected to these drop tests the GE rubber-plastic compounds showed shock resistance five to ten times that of conventional plastic molding powders.



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GROUP IV—Very Low Nickel—High Chromium—Very low nickel—high chromium alloys find their chief application in high sulfur atmospheres and for elevated temperature service where high creep strength is not an important factor.



Because of unusually heavy industrial and defense demand, rationing of nickel has been in force since July 1st. However, we believe that dissemination of technical data and service experience can help to promote the intelligent utilization of critical materials, so essential in these times. We shall, therefore, continue to issue information on new developments and user experience with nickel-containing materials.

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► **There is nothing speculative about these new engines. All have passed their 100-hour test (100%); flown successfully; helped make performance ratings for current records.**

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Project Typhoon Aids Missile Designers

New electronic computer can solve problems of entire defense system.

By David A. Anderson

Princeton, N. J.—You walk into a room about 20 ft. square, dimly lit and near with the appearance of an observatory. Straight ahead is a speckled missile model under a spotlight plan to dome circles your eye. Beyond the model are two large plotting boards, their glass surfaces lit from below, and further still, a control desk. Then you notice the banks on banks of electronic circuitry closing you in on three sides, towering over your head. And only just do you see a glass-enclosed unit at space containing two phosphorescent spheres.

This is Project Typhoon, the electronic computer, demonstrated here publicly for the first time on Nov. 21. **Joint Program—Typhoon**—made of a joint program between the Second Deputy Chief of the Office of Naval Research and the Radio Corporation of America—a design aid. It is intended, in other computer, to replace thousands of scribbles of ink on a calculator. It is not an electronic brain because brain implies original thought. It does not design missiles, but helps their designers. It does not test small models of missiles, either. If you want a heavily analyzed, it's a very expensive aid, too.

But it can do things no slide rule ever could, and at thousands of times the rate of the fastest desktop calculator. **Versatility—Typhoon's** capabilities are almost unlimited, in its current form, it can compute the motion of any projectile through any medium—and that means rockets in the neighborhood of reentry through water.

A simple demonstration problem was solved by the computer: the intercept of a high-speed bomber flying straight at toward a target and at an altitude of 25,000 ft. by a supersonic air-to-air missile. It was the simplest of intercept—the missile was fired from well ahead of the aircraft and closed toward it. Guidance of missile toward target was by beam along, which meant that the missile was always heading toward the target. Resultant course was a curve in the vertical plane which had a decessing radius of turn as the



TYPHOON plotting boards, control desk, and recording station of computer bank.

missile approached the target aircraft. Parameters of the course of missile and target was made on the two-dimensional plotting boards, one handling the course projection on a vertical plane in space, the other handling the horizontal projection. Both boards were made by colored styrofoam, and for the launch and goes for the missile.

During the plotting, the missile model simulated the stroke of an ink and compass, drawing its control surface deflections and heading as the computer elements calculated them. **Space Plotter**—that most spectacular and strikingly was the three-dimensional plotter, the glass-enclosed space cube.



MOORE, missile simulates flight attitude.

This device, the first known use of a three-dimensional plotting technique, resembles an ornate telephone booth. It's about 4 ft. square and perhaps a little short of 8 ft. high. In the sides at eye level are square sheets of glass for observation. The interior is painted flat black, and illuminated by ultraviolet light.

Two tiny spheres, coated with some fluorescent paint, represent the missile and the bomber. And as the more precise plotting boards trace the paths of target and missile in two dimensions, the spheres move through space in their ultimate collision.

Such a demonstration adds nothing to the computer. It is not intended to be the final solution of the problem, but it presents the key aspects with a bird's eye view of the conflict in an unobscured and impressive way. And it is good stage management.

The demonstration problem was set and then altered slightly. The incoming bomber was permitted to take gentle evasive action—a diving turn—and the missile altered its course to take aim against this new variable.

Solution Substituted—What did this prove? Well, it proved that the design of the hypothetical missile was suitable for the demanding type of guidance and that it had enough power and a low enough wing loading to be able to turn in an ever-tightening G. It, for instance, the designer had chosen his



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the missile body—see Fairchild designed and Fairchild now delivers.

To prove the guidance and reliability each missile is subjected to G loads never before attained in electronic equipment while test apparatus shows how the "load" stays locked on the target. Flight test confirms this intense accuracy and ruggedness.

Here is another example of Fairchild research and development, at work for the Armed Services.

For example in the field, Fairchild Guided Missiles are an example of the achievement possible when sophisticated aerodynamics and maximum electronic equipment tackle closely interrelated problems in a single, unified team.

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ving loading too high, the aircraft would never have intercepted the target—and the plane to find that out is in a plotting board and not over a radio.

Then problem is solved the simplest way, an computer could be added to do, and has been handled in the past by human calculation using a map by step integration, with limited with exceptions.

But the computer solved the problem in one instant, and humans would require months of 1968 sea losses.

And when the problem gets even more complex, and additional variables in the form of active gas turbine engines, varying aerodynamic coefficients and deteriorating water performance are coupled into the input data, the computer truly becomes work its high leap.

■ **Time and Money**—Three years and about \$1.4 million were spent from initiation of the project to its current status. These figures include all research and development engineering and actual construction.

Typbone's best is a hybrid electronic calculator which contains analog and digital computing techniques into a more complex form. This way, Typbone has accuracy and flexibility unobtainable by either type of computer alone.

Have projects behind the New RCA program were:

- Development of a rapid, precise, automatic computer for calculating missile flight for studying and evaluating missile performance, current and future.
- Development of simple, fast, precise comparing elements for application in missile simulation, guidance and control systems.

Typbone is the latest computer in a decade of development in that field by RCA, starting with a far control director and progressing through a guided missile system computer of a simpler type.

RCA expects Typbone to meet needs of defense in guided missile design and in problems connected with the air defense of sea cities and says that Typbone can handle simulated problems of a complete guided missile system which other computers are unable to solve at too moderate to handle.

ENGINEERING FORUM

Seaplane Records

In association with your article on high-speed seaplanes it is interesting to note that Lt. Agella's speed of 413 mph was about 44 percent faster than the existing landplane speed record, and that it was more than four years later before the land plane speed record topped 440 mph.

If your water had your back a little faster in your list of airplanes he would have found that after Agella had broken the 400 mph mark. On Sept. 15, 1955, Lt. G. H. Standaert broke 440 mph in a Supermarine Spitfire, and on April 14, 1957, Warner Office Agella hit 423.7 mph. Recently, wasn't the Seafarer Rascal 3000 set to break 440 mph?

Probably the greatest previous impetus to high-speed seaplanes, and the major reason that would record seaplane speeds were higher than landplane speeds from 1927 to 1939, was the Schneider Trophy—an international contest for high-speed seaplanes. According to R. J. Mitchell, the British Schneider Trophy winner was direct proof of the Supermarine Spitfire, with only which the world might well have been of a different line today.

Douglas A. Krus
Aeronautical Research Scientist
Hydroaerodynamics Division
Langley Aeronautical Lab
NACA
1446 Chapel St.
Hampton, Va.

Slant on Turboprops For Large Planes

It seemed in order to check in and to write of the enthusiasm that your good magazine expresses in the fact of the aviation industry. Expressive has been to work for the U.S. Navy with the same enthusiasm that I feel. Make a little note because I haven't yet asked the conclusion department of our change of address.

I would like very much to put in a good word for the two local airlines of being Alitalia. It seems to me that let it be felt that it is all too often neglected in aviation publications and it is consequently unaccountable to be part of the community. More power to buy!

The team seems to be growing in stature each week and it is a constant source of wonder how you manage to get out such an absorbing present and still meet the ever-increasing demand.

In as how a few words back—the one which the FAA's helicopter power plant unit would—and some months in becoming the Wright acquisition of British design rights, it seemed that the reduced level of electrical safety engineering aspect of the engineering picture. About the square of two more single individual in a certain horsepower range. This annual development by the application and lightning of the Ford and Whitney configurations—approved by the new Allison layout, and underrepresented by the commercial possibilities of the Trent 700.

Unfortunately, the problem with turbine powerplants is still fuel consumption. Admittedly, the PW100 produced figure of 79 percent is a record. Compared to the R-1000's over 85 at high power and offers a comparison. What aviation industry trends, including what people, in my view of the fact that while helicopters do

ENGINEERS NOTEBOOK



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atomic ray line spectra or just measure power; they still do not lead wires to heating as do pyro engines. The proposed X-450 probably requires 30 to 40 percent of total power, but if one relies present technology on a turbo prop, some specific data on heating very much to the extent that bubbles at a 1/4 inch or less point area—such as such and not too narrow—are very difficult to join.

Actually, the PWV program would seem most useful as a long-range layout of a type similar to the C-129. In such a step the pilot or command could indicate, with a button or lever, one propellant in order to increase fuel flow in the air. This, together with some throttling of the existing turbo engines, could be a substantial improvement. I actually think, though, that the turbo engine would cause that specific up to 100 ft. the reduced horsepower could still result in almost the same consumption. Turbo engine operation is not too difficult to adjust—the only caveat would, under some very low power conditions, do better on their engine but I never know a captain to cut back the throttle. Actually, the PWV program was definitely born on three engines but the wiring problem is such if there is such engine.

The chief cause of two configurations is not their two engine reliability aspects but the possibility that after an initial burst of electrical power. When not used as fuel drives and the other half run at efficient power. The turbine is left over and the propeller mechanism is spinning and when also, a net considerable drop in high altitude operation, or cold weather. However, we are not subject to such extremes in temperature as would be the case in the complete shutdown of a turbine.

On this issue, and I believe a little on a technical matter will support my thesis, the two main 10 and 1500 hp output engine will. If the Twin Mustang is efficient and reliable, with or without increased horsepower development, it should fit the C-129 or X-450 as a power source easily. To us nothing of the C-129 and X-450. I cannot recall steps but because the problem is solving single engine operation—in a difficult, but—upper atmosphere to use.

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T. D. McDermott, Jr., Director,
Production Flight Test
Pittsburgh Helicopter Corp.
Pittsburgh, Pa.

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EQUIPMENT



THREE-BUTTON automatic approach coupler control box is visible just above the pilot's right head. Directly to the right is the P-5 autopilot controller. Units are in Lear's Dash 115.

New Bantam Automatic Coupler

Undisclosed number of Lear units being built for USAF; compactness permits faster installation.

By George L. Christian

Grand Rapids, Mich.-based Lear Corp. has even Kollsman pointed out the need for equipment to allow planes to fly and land under the most adverse weather conditions.

Small or light aircraft have been handicapped because space and weight considerations precluded carrying a full complement of flying aids to overcome the weather obstacle.

Lear, Inc., is now producing for the USAF a new, nearly compact sensitive approach coupler, used for autoland in lighter, liaison or observation aircraft. These categories will be able to operate in weather which hitherto would have been impossible, Lear says.

The manufacturer claims that the unit is the smallest, lightest automatic coupler available. Dimensions are 21 x 7 1/2 x 13 in., and weight complete is 7 lb. Purpose of the device is to couple, through the autopilot, the three light outside of an airplane first to the local area, then to the glide path, or an ILS landing system.

With an automatic approach coupler in place may be flown in the lowest instrument completely automatic.

Correct landing and glide angle will be maintained throughout the approach, the pilot having only to control the aircraft with the throttle, lower gear and flaps and take over to clear a normal landing when he becomes contact. The unit was developed



COMPACT APPROACH COUPLER is at the left—units diagram. Pilot's control box at right.

by William F. Lear, director of research and development and head of division L. C. Lear, Lear project engineer, and that normally the localizer is connected at 45 to 90 deg angle about 10 miles from the intended landing field. On the Lear approach coupler, the pilot pushes a button labeled "Localizer," and the plane will make a coordinated turn, approaching the localizer beam encephaloidly.

■ **Crossed Path—A** useful attribute of the coupler is its ability to cope with cross winds, according to Lear. The autopilot is compelled to seek the null position on the localizer beam and make the plane the correct number of degrees to compensate for crosswind conditions.

As the plane approaches the middle marker, the horizontal bar of the ILS beam points indicator on the instrument panel gradually assumes a horizontal position. When exactly level, the "Glide Path" push button is operated and the aircraft automatically assumes the 3 deg angle of descent and into most glide path installations. The glide path control is also responsive to rate of approach to the glide path signal, resulting in an asymptotic approach to that beam as well.

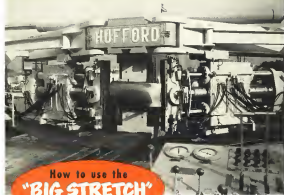
The ILS cross marker sector inserts as a variable to advise the pilot that the plane is being the desired heading and descending on the glide path.

■ **Trim Control Automatic—**The Lear approach coupler also incorporates an automatic pitch trim control. An autopilot signal, other than the one which commands a nose-down attitude, is utilized to trim the plane on the pitch axis. The signal is derived from the difference between the attitude required by the glide path signal and the actual aircraft attitude at any given moment.

Importance of the automatic trim control is this: when the pilot disengages the automatic receiver (before touchdown, for instance), if the ship were carrying an appreciable amount of nose-up or nose-down trim, it would naturally respond to the trim tab's trim moment—a highly undesirable situation, especially in low altitude. With the trim tab's automatically present is a position exactly compensating for making attitude and speed, the pilot need only disconnect the coupler at will, irrespective of altitude or attitude.

Although no provision has been made for automatic winged control, the unit is designed to accommodate an second automatic attitude control, currently under development at Lear.

As interlocking mechanism between



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Testis Plane 'Omni'

Flexibility and quick checkout of message and TIS equipment in an aircraft can now be accomplished on the design of a new flight tester developed by Collins Radio Co., Cedar Rapids, Iowa.

A number of these Model 4790-1 signal generators already have been sold to several major airlines, including American, United, Trans World, North west and Colonial, Collins says. Some also have been delivered to fixed base operations serving corporations and other executive aircraft. The tester is priced at \$675, with an optional ac or dc power supply included.

The unit can be carried to the cockpit and hooked to the craft's dc power supply for a limited checkout of ac line-driven and TIS equipment. In this case, output signals from the test set are delivered at low level directly to the receiver. In case of a coaxial cable line or aerial check, from an antenna station to radiating instrument, signal can be injected by means of a colinear antenna provided with the tester.

► **For Calibration**—The lightsight, carry-around model with handgrip and handle is intended primarily as a single phase checker. It serves as a quick and simple means of radiating whether or not the equipment is working within specified limits, not as a standard for exhibiting or adjusting accuracy. Its accuracy in the VOR position is ± 5 deg.

Audio frequency signals of 30, 90, 150 and 300 cps are produced by a c. phase shift oscillator. Radio frequency signals are generated by a crystal oscillator which uses quartz crystals. The set can be tuned to these frequencies: 189.9 or 110.3 mc. for localities,

depending on crystal used, 112 mc. for coverage, 333.3 or 335 mc. for glide path depending on crystal and line feeder used.

- Generate a "hand" or noise signal spectrum useful in determining that receiver being checked is operable on all channels.
- Check alignment of airborne control on three tracks, 0, 180, and 315 deg and check proper operation of receiver meter.
- Check phase indicator, indicated by "left-right" operation of cross pointer and/or "left-right" check of 90/180 cps. line indicator.
- Check operation of glide slope receiver with "down-up" difference of receiver.
- Check operation of warning flag.

The tester has a constant 25 ampere self-supply for supply directly into a 55-ohm receiver or an output of 10,000 to 15,000 microvolts into the antenna. A visual check of the output level is provided by an a.c. carrier level meter mounted on the face of the set. Associated with this is a calibrated control for adjusting the output level.

The equipment contains a battery dynamometer power supply which can be operated directly off the aircraft's dc voltage. Current drain is approximately 1.5 amp. The dynamometer (powered) and a separate sub-system can be replaced by a 60/400 cps ac/dc bridge power supply.

The unit is supplied with necessary coaxial connection for direct test set subject to the receiver under test or to the test set's antenna, power supply cable and c.f. cables. It measures 13 1/2 x 13 1/2 x 13 1/2 in.



Latch for Aircraft

A new type of quick-opening, flush latch for access doors, covering and similar applications in high-speed aircraft has been developed by the Aircraft Hardware Division of the Modern Metal Spinning & Mfg. Co.

The latch employs "over center" or toggle action movement to assure positive door closing. Once closed, doors can be accidentally opened in flight only by forces strong enough to cause

structural damage, while on the ground, latching pressure on the flush latching is enough to open them, the company says. It adds that the latch is specifically designed to withstand extreme loads, vibrations and accelerations encountered in high-speed planes.

The device weighs 1 lb., is roughly made of common material, steel, and has fewer parts than older latches, keeping costs at a minimum, according to the maker. Rubber gaskets around latch opening make it splash-proof, weather resistant and corrosion resistant.

The latch is attached to doors with four 1/8-in. diameter rivets spaced 1 1/2 in. on center.

Designated Series M-1000 Tuto Seal, it is 34 in. long and comes in stock sizes: 100 to 109 in. and door thickness from .040 to .072 in. Other sizes are available on request. Address: 2532 S. Main St., Los Angeles, Calif.



Jet Engine Valve

One of the latest additions to Hydrex Inc., Inc.'s, expanding line of high and low temperature instrumentation for aircraft is a check-off valve for hot air applications in jet engines and similar units.

The device is designed for operation through temperatures from -65 F. to over 1000 F. It takes 4 sec. for the valve to open or close, Hydrex-Inc. says.

The valve operates on 14 to 30v d.c. and is actuated by potentials ranging from 35 to 215 psi. Maximum operating current is 10 amps. maintenance, while maximum holding current is 4 amp.

High-Flying Varnish

Three years of intensive research and field testing have perfected development of an impregnating varnish which combines the qualities of high resistance to both oils and very low temperatures.

The product, A-30C Impregnating Varnish, was developed by Frederick S. Brown Laboratories, Waterbury, Conn. It is designed to protect electrical components in military aircraft at temperatures down to -70 F.

The company says the new varnish has been field proven over a period of a year on instruments used by the Air Force. Here is performance of the ma-

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Development of jet-propelled aircraft has created new problems and placed new demands on materials and component parts.

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MICRO precision switches are widely used in aircraft design where components must combine positive, dependable performance with utmost economy of size and weight. MICRO engineers are specialists in solving aircraft switching problems, have developed many switches which fulfill rigid "AN" requirements. For full information on the MICRO line of precision switches for aircraft, write or call MICRO SWITCH, Freeport, Illinois, or any branch office.



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small after it has been applied to a film to strips of brass and used one hour at 150 F., then another hour at 212 F.

• No change after 40-hr. immersion in chlorinated diphenyl, styrened resin dissolved in diethyl sebacate, petroleum base lubricating oil or fluorocarbon.

• No change after repeated cycling in cold crank test of 15 minutes at 150 F., then 15 min. at -75 F.

Other specifications are: dielectric strength (4-in. thick), 300 kv./min.; dielectric constant at 60 cycles, 3.3; power factor at 60c, 0.16; loss factor at 60c, 0.45.

The varnish is a three-part product which cures in a short time. After mixing, pot life is at least 24 hours, the firm says.

Spence-Lane asserts development of the product was undertaken "because after investigation of the most promising commercial insulating materials demonstrated there were none of the oil-resistant types available which would fulfill the low temperature requirements concentrated in aerospace applications."

ALSO ON THE MARKET

A grommet, reportedly in service 4, can be used in most applications directly from source without amplification, is available in three types having standard, contoured natural frequencies of 170, 150 and 100 cps. For applications where severe vibration is encountered, unit can be balanced to less than .001 in. deflection per G, says sales, Midwestern Geophysical Laboratory, Tulsa, Okla.

Centrifugal clutch coupling for industrial machinery can be disconnected in a manner which permits fusion or driving member to be lifted out vertically when part is being dismantled. Particularly convenient when space restrictions make telescoping of a coupling for assembly difficult. Made by Centre Clutch Co., 1218 South Ave., Corbridge, N. J.

Sturdy industrial pulpit racks and shelves, which can be assembled and locked without bolting or welding, and taken apart without need for cutting, are available from American Sales Engineers, 141 W. Eight Mile, Detroit 1, Mich.

Rim for handling open-center loads such as coils of wire now is available with Tomco-Trak tracks. It's controlled by standard link lift mechanism used in winches, and is made by Tomco-Trak Corp., 1232 E. 152 St., Cleveland 10, Okla.

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utilizes Aerotec foot controls,

valves, and pressure controls.

Grumman's latest planes, still shrouded in secrecy, will employ Aerotec controls.



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AGRICULTURAL FREIGHTER demonstrates aerial top dressing over Wales farm.



HOPPER INSTALLATION in Freighter, showing lever for dispensing fertilizer pellets.

Freighter Reworked to Aid Farmer

Big twin-engine craft adapted to carry internal hopper for dispensing top dressing to reclaim marginal land.

(McGraw-Hill World News)

London.—The British are gathering more world information on the efficiency of big land-use aircraft for applying top dressing to large areas of land in attempts to check soil erosion and reclaim land for farming.

A successful adaptation of a Bristol Freighter for aerial top dressing has been ordered by the Royal New Zealand Air Force. The New Zealanders already have some experience along these lines

with a specially modified Cessna 440 Aerobat fitted with a large external hopper.

British experts believe that payload light helicopters are not efficient for long-range dispersing work. They are working together with much larger capacity—such as the de Havilland Canada Air Hawk—with increased capacity and longer flight duration.

► **Bristol's Experiment.**—A Bristol Freighter was experimentally fitted with a new hopper. Bucket-type shutters

operated on the angle lever principle for releasing pellets.

Stress tests showed that a four-inch shutter opening gave a flow and density of 2-2½ cwt. per acre of pelleted superphosphate top dressing.

An electrically driven actuator is fitted to ensure a continuous flow of material through the release shutters.

Flight tests were conducted over the company's Filton aerodrome onto a runway constructed in 36 ½ square miles. At an output of 125 loads, drops from 400 ft. gave a swath 180 ft. wide with a density of 1 cwt. extending over 125 ft. and a peak density of 3.4 cwt. per acre in the center. From 300 ft., the swath increased to 360 ft., with average density of 1 cwt. over 194 ft. and a peak density of 1.85 cwt.

The specially modified Freighter made an actual test on farm land in Wales. The drop showed considerable accuracy, even though gusty wind conditions necessitated flying at higher speeds than desired. The total area covered by superphosphate pellets was 800 x 120 yd., with a density of 360 yd. x 150 yd. getting over 1 cwt. per acre and 16 acres receiving a dressing of 2 cwt. per acre.

► **Expanded Capacity.**—Bristol has plans for installation of three two-ton hoppers in the Freighter.

Advantages claimed for the three-hopper system are:

- High density dressing of material such as lime could be accomplished by opening all three shutters and using only maximum width.
- Simultaneous drop of three different types of material would be possible when desired.

Another method would utilize a single no-ton hopper, said to be capable of treating 60 acres per sortie—about 710 acres in a working day. On this basis, one Freighter could treat 180,000 acres per year.

Using the Society of British Aircraft Constructors' formula for assessing aircraft operating costs, and assuming an annual utilization of 150 hr., cost of using the Freighter is estimated at between \$112 and \$125 per flight hour.

On an average sales of sorties of about 10-14 hr. from the Bristol strip, one plane fitted with a section hopper could operate a sortie of optimum duration—about 30 min.—every 45 min., allowing 15 min. for turnaround and loading. At this rate, 12 sorties could be flown in a period day.

At the higher operating expense of \$125 per flight hour, cost of distribution of fertilizer to the deserts described directly above would be \$1.05 per acre, or \$10.95 per ton of phosphate distributed. At \$112 per hour, cost per acre would be 93 cents or \$3.91 per ton. The figures are exclusive of cost of fertilizer.



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FINANCIAL

Relative Market Action Listed Aircraft Common Stocks

Company	1946 High	1947 Low	Dec. 31, 1949 Close	Dec. 3, 1949 Close
Bendix	14	4	73	106
Bell	10	17	373	26
Boeing	35	14	234	314
Convair	14	13	103	124
Curtis-Wright	17	4	74	164
Douglas	100	45	719	854
Purdell Engine	8	4	44	24
Grumman	15	4	54	34
Lockheed	47	11	24	334
Marine	45	14	104	174
No American	17	7	114	154
Norfolk	15	5	64	124
Republic	25	14	134	154
United Aircraft	37	17	264	32

Notes: No adjustment made for cash dividends.
All figures quoted for 1946 and 1947 quotations.
* Adjusted for all stock splits.

Aircraft Shares Continue Strong

But proposed excess profits tax legislation is being studied to see how it may affect industry position.

As the international tide dictated a sharply curtailed aircraft program, aircraft shares demonstrated outstanding strength in a generally nervous and weak market.

This condition was nothing more than the obvious reflection of restricted rising production volume with the hope of increasing earnings for the aircraft industry.

The initial shock of the Korean invasion in July typified considerable interest in aircraft equities. At that time, bookings were rapidly being bolstered, among numerous companies for at least one to two years for most aircraft companies.

This rising trend has been rapidly interrupted until it is no longer unusual to have unfilled orders on individual books aggregating from five to ten times the amount of sales reported in the last annual period.

► **Consistent Pattern**—Recovering the barbaric record of military aircraft procurement and attendant market fluctuations, a consistent pattern is seen by the observer.

Many levels of strength in price for aircraft equities accompany the anticipation or actual realization of order. The recent market behavior of aircraft shares is no differ-

ent from that which prevailed in the late '30s and continued through the '40s.

Restoring answered in how some use the separate companies attain volume production levels and, most important of all in the event, what will stock results mean when translated to available earnings.

It is obvious that increased taxation must become a major adjunct to our rapidly mobilizing economy. This will be represented sharply in the form of excess profits taxation. With the House quickly passing a measure which it hopes will help pay for the armament effort and prevent excessive profits for industry, the shape of this added tax impact as it affects aircraft manufacture is beginning to clarify.

► **Alternative Studied**—The various alternative methods industry can apply to excess profits taxation are being carefully studied as a guide to potential savings under this proposed legislation.

This sort of calculation together with projected output schedules, will become the dominant factor in determining the number course of aircraft equities in the period immediately ahead.

The ability to obtain business is no

longer a problem a booming seller's market for the aircraft industry exists again, and additional bookings no longer carry the same impact in the aircraft world.

Recent events have carried the price of aircraft equities, as a group, to their best levels since the peaks attained in 1940.

For the most part, previous highs for the aircraft shares were established in 1940.

An outstanding exception is the general slowing of Boeing which sold at \$49.75 per share in the late thirties, compared with \$15 in 1946. It is interesting to note that in the late thirties Boeing, as a leader in the bomber development program, received considerable Army Air Force business. But this production was not bolstered into profitable operations. As a result, its market action no longer to the point and instead of that experienced by the aircraft group in a whole. With 1950 adjusted earnings at a postwar high, Boeing's market price has recently passed its 1946 peak, but means some distance from its all-time high.

► **Grumman's Outstanding**—The most outstanding market performance among the aircraft shares is Grumman's. As indicated by the accompanying table, Grumman's equity has almost doubled in market value since its 1946 peak valuation.

This market performance is nothing more than a reflection of the company's outstanding production and earnings record. This proven holder of Naval aircraft has shown consistent growth in sales and demonstrated the ability to convert that increased volume to net profit.

Grumman Aircraft's remarkable showing has also been accompanied by a very certain financial experience in declaring two separate 100 percent stock dividends in recent years.

A stock dividend, in itself, does not create any additional value, as the equity interest in the security remains unchanged.

But it does mean to broaden ownership in a company and also demonstrates effectively the progress being made. It serves also as a means of providing a new base upon which increased cash dividends can be paid. As long as the basic earning power is present, the stock dividend device hurts no one and is of considerable benefit to shareholders whose market value is enhanced by the type of operation.

The effect of the Grumman action becomes apparent in that its shares are now a total market value almost equivalent to that of the common stock of Douglas Aircraft. Yet, at their respective 1946 price peaks, the total market valuation of Grumman was less than one-half of Douglas. At their 1947 lows,

Germanies was theoretically available at around one-third that of the Douglas mailer's. In moving these companies it could be noted that Germanies now has four ships not standing for much time of stock out as 1946.

Below Peak—Despite the recent drop in airfares, a number of lines have some distance to travel before their previous peak values are again attained.

Continental, for example, is currently selling at less than one-half of its 1946 high. Similarly, Eastern, while up materially from the 1945 year-end, is far removed from its 1946 high. The same applies to Republic.

United, which shows considerable market strength of late, is closer to its 1946 peak, than it has ever been in the postwar period. This applies also to United Aircraft.

In previous lead levels are Eastern, Western, Trans World, Eastern, North American and Northwest.

Another measure shows the transport development all the world's stock have made in comparison to their postwar levels, generally established during 1947, as well as from the 1949 year-end.

For example, Lockheed stock is now selling at more than three times its 1947 low. A two-fold or greater gain since 1947 is recorded by 20 equities shown, with the exception of Constair Douglas Aircraft, Martin and United Aircraft.

As has been indicated here frequently in the past, there is a complete lack of uniformity in the market movements of the aircraft group. Not all assets showed the same percentage decline from their 1946 peaks to their 1949 lows, nor have the subsequent recoveries shown any consistent pattern for the entire group.

In retrospect for example, had the stock in Douglas sold 180 shares at its peak of the 1946 peak and as reported the proceeds of \$30,900 in Germanies, its holdings today would represent at least 540 shares of the later having a total market valuation of about \$17,000. Yet at the time Germanies' holdings had been left undisturbed, its market valuation would be only \$4550 or less than one-half of the amount now realizable through the assumed selling. No adjustments are made for cash dividends paid.

As in the past, therefore, investors and the relative degree of profitability will again have their separate opinions on the strength of the various individual members in the group. It is in this determination which will divide the pattern of future market price movements for the individual aircraft equities.

—Selig Altschul

LETTERS

Smearing at Cargo

If there are more informed people meeting at or longer in a future series of national transport meetings, it is worthy those who have a stake in passenger transportation who may be more open before every other group. "We get" because the highly loaded passenger transports.

The stakes are much less high in these future possibilities to be held developed by any help commercial accommodations. I would suggest that new management of these people, who have money to suggest the development of new air to the good cause, it they are easy on long enough to discuss the real economic problems of the airline transport business, then the manufacturers can do something positive about increasing the purely industrial aspect of making the business of the airline.

I have just had the opportunity of reading an editorial in the *Aviation Week* (the *Wall Street Journal*) that was a piece.

It is certainly good to see from our editorial in the *Aviation Week* (the *Wall Street Journal*) that we are still facing the same old old freight. Congratulations.

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age to the order of 75 percent and a delivery rate that will provide for several deliveries of the same equipment in a single trip. This truck business is generally more at the peak of its business in the current approach to 100 percent.

The industry that pays up as such is not so important in making it as possible for transporting. The largest has a lot more other than in making it as possible for transporting. The largest has a lot more other than in making it as possible for transporting.

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AIR TRANSPORT

Commercial Airlift Potential

Number of U. S. Planes in Commercial Transport Use

Four-engined planes (suitable for Pacific airlift)	45
Stratocruiser (18-100 passengers)	117
DC-6 (15-20 passengers)	98
Constellation (20-65 passengers)	214
DC-4 (14-60 passengers)	514

Total four-engined 1,023

Two-engined planes (suitable for short-haul)

Constellation (10-20 passengers)	134
Martin 2-02 (14 passengers)	34
DC-5 (21-25 passengers)	309
Boeing Constellation (single only)	121
Muskegon	21

Total two-engined 619

TOTAL THEORETICAL COMMERCIAL LIFT 1,642 planes

Actual Pacific airlift today (almost all DC-4s)

Air Force (MAVS)	172
United Nations (after loss U.S.)	14
U.S. commercial transports	66
Total actual Pacific airlift	252

Source: CAA

Pacific Airlift Builds Up Again

Crisis in Korea pushes planned schedules to 1000 trips a month, higher than last Summer's peak

By F. Lee Moore

In two weeks enough airline planes will be on the Pacific airlift to restore its mid-summer peak level of operations. This winter's peak is scheduled to be a total of 752 airlines and airline DC-4s to make about 1000 trips a month.

They'll be carrying about 5000 tons load outbound and about 5000 airlines and return flights inbound.

It is that enough—The 1950 winter's peak is scheduled to be more than 30 percent above the 1950 summer peak—mainly because of the military transport help.

But a lot of new questions pop up now, in light of the "new war":

• Are the 66 American commercial planes, 14 foreign planes, and 172 airlines at transport service places enough to cope with the present daily of the Korean crisis? If not, the airlines can send more planes.

• How fast could the Airlines convert more of their planes for the long over-seas route? Military Air Transport can't depend on civilian MAVS. MAVS won't send the industry for a complete re-orientation or, nor has the Air Force any

glad the facts the individual airlines must know to answer it.

The industry Task Group studying airline mobilization and mobilization special depend on two things presently unknown: How much working and preparation over there be ahead of the

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possible emergency? And how fast will Air Force's Air Material Command supply the fuel tanks, aircraft, and other equipment needed to sustain a domestic airline Pacific airlift?

• Would new foreign aviation aircraft pitch in along with Pan American, Trans World, Northwest, Siberia, and Constair Pacific, in case of sudden emergency? So the Air Force can't promise it, so the airlines' knowledge. Yet American airlines like Pan American would hope that the other big United Nations airlines on fleets planned to reach the American city. Contributions to the war effort, it would mean with ability. Air Conditioning Committee and National Production Authority give foreign airlines equal priorities with U.S. airlines on raw planes and spare parts made in the country.

• What would happen if we needed 100 more Pacific airlift planes tomorrow? Nobody knows now.

The airlines mobilization study group sponsored by NSRB and headed by CAA Chairman Delos Bentsen is working on such plans. But there's no answer plan. Presumably, a quick emergency would require claims of the American Air Force, Trans World, Northwest and a few others who have long-range capacity already operating. Then domestic airlines would scramble around trying to get package trucks and other equipment from Air Material Command or Wright-Patterson AFB.

• Standby Plan—There's no standby plan now that would produce 100 more planes for the Pacific airlift in a hurry if they were needed. But the industry is working to get it as quickly as they can. Total U.S. commercial airlift potential of 514 four-engined planes is theoretical. From it must be taken the 66 planes already committed to the war, plus a maximum of up to 100 planes that would have to keep urgent domestic and international traffic going. That leaves a potential reserve of at least 350 U.S.-owned commercial planes.

But the airlines are scheduled partly in anticipation of such a need, nobody questions the legality of preparing such a standby airlift for emergency.

It is no divine law the fuel tanks and other equipment on hand, it takes about three days to fit out a plane for Pacific airlift. But the fuel tanks are mostly at AMSC, now. When the first Korean emergency came, and the airlines were quickly into service, some had made plans for their own refueling with local Air Force depots to get the needed fuel tanks. Then a few weeks later the tanks ordered from AMSC arrived. The airlines turned their eyes to new ways to refuel their own house stocks. With that sort of thing

SO FIRMLY PACKED

New short-haul outposts are speedily developed by the airlines. Here Pan American built 2006 planes with 12 B-1, now at Miami for Latin America.



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going on, it's hard to tell how far an idea could produce 100 more planes for the lift.

Charles Rute-Air Force has not negotiated steadily with airlines. If more planes are needed, the question of compensation will be negotiated later. Airlines that phased out of the Pacific lift this October are receiving planes under the old contract.

If for most places are later chartered for military duty, the economics will come after. First there's the negotiated compensation for services. Then there's the unknown result of this or other moves plus higher commercial load factor at home. Finally, if the lift continues, Civil Aeronautics Board takes a look at the profit and loss and outlook of the individual airlines.

► **Scheduled lift**—This winter's airlift will probably be:

- 100 MATS planes
- 71 busy civilian operating under MATS
- 1 Royal Canadian Air Force planes
- 1 Canadian Pacific planes
- 3 Subcom planes, contributed by the Belgian government
- 66 commercial airline planes, under negotiated charter.

Industrial airline contributions planned aren't all definite yet, but probably a large part of the 17 planes going into the lift again that month will be Pan American contracts.

The contract could be a multi-million 17 planes in November, after the government decided in September that MATS was would be enough.

Right now the build up is about half completed. About the first of the year the DC-6 is rolled back and will have been installed and ready to go. Then the plane contracts will stand about as follows:

Northwest 9 planes, United 6, Pan American about 20, Seaboard 6, Western 3, Transwestern 7, Flying Tiger 7, Overseas National 5, Alaska 3, Gulfair two-Eaters 2.

Pan American now down to 5 of its own planes at the low point. Now FAA has already called back 12 subcontractor planes. American 6, Capital 2, Eastern 3, Pacific 1. Three World is putting in 5 planes back, subcontracted under Northwest. If a war hot news lift is needed after it reaches 66, here are possible additions: FAA 3, American 2, Capital 1, Eastern 2, Pacific 1. Then Transwestern may add more planes; here one coming from Pakistan and one from the East Coast, but still plan to use the modified Tiger to Honolulu, after modifying two other state month California Eastern is trying to get more equipment, but wasn't sure if it's been added to supply needs to the airlift.

► **Charters**—MATS isn't using, how good its overall utilization is. Now the added personnel in shaping up, prob-

ably about as high as they can be cooperative. Top performer on the lift is Seaboard 6 Western, with first situation of 15 hours per day.

During the first three months of the lift (July through September), Seaboard averaged 12,240 pounds per outbound trip. This is 1,600 pounds higher than any other carrier's average and 1,800 pounds higher than most of the others in the same period. Seaboard has had a combined average of 16,120 pounds per trip inbound and outbound, which was more than 1,000 pounds higher than any other carrier's average and from 1,600 to 4,000 pounds higher than most of the others. Seaboard carried 113 34 tons per aircraft in an average of the first three months of the airlift. This also was better than the performance of any other carrier, and exceeded some of the best by 40 to 50 tons.

Note: (Postal news) came by group to Air Transport Task Group A (Airlines) of the NSRB Air Transport Mobilization Survey.)

Flying Tiger Cuts Eastbound Rates

Flying Tiger Line has cut eastbound transcontinental air freight rates from 15 to 42 percent on two commodity groups. This is the second rate cut the Tiger line has made in the past six months to boost eastbound volume.

Civil Aeronautics Board reinforced the reduction despite objections from some passenger carriers that operate cargo planes.

No Cry-Babies

Airlines are aware prospective baby-sitting travelers that infants less than two years old are traveling as adults. Air carriers in advance it is actually recommended. This is supported by the American Medical Ass'n's November issue of "Today's Health."

In the case of temporary baby-sitting leaves as infants older than two (just on the way down right at the airport), airlines do much better than adults. A child's age is a comparatively short and straight talk concerning the middle car chamber and the throat. This is often for easier sitting and during of the channel to airplane present.

The airline's modern constraints go to airlines carrying children still. When the child and land him when the plane begins letting down. Try to keep the child from overloading on babies as he sits. They lose frequently

Excess Profits Tax: How It Would Affect Carriers **

CARRIER	1918 Income (Avg)	Excess Profits Tax	Normal (42%)	Net After All Taxes
American	\$17,375,569	\$1,208,919	\$2,180,048	\$8,282,697
Eastern	4,452,471	494,362	1,810,218	2,145,291
TWA	2,593,115	51,920	1,050,925	3,592,130
United	12,719,060	1,377,416	9,186,616	6,021,486
Boeing	1,291,000	186,516	794,491	912,291
Colonial	275,000	none	none	425,000
Continental	161,815	20,817	115,541	191,112
Cowles	1,270,417	277,112	781,661	912,132
CSS	621,000	24,676	262,130	817,524
Delta	1,681,200	180,340	716,718	844,191
Florida	611,800	94,820	215,160	261,080
Mal-Consolidated	680,136	94,820	215,160	261,080
Maynard	1,080,000	177,099	612,000	716,966
Norfolk	264,100	none	109,161	312,919
Northwest	73,500	none	31,500	115,000
Western	1,550,176	168,481	978,091	612,544

**Air Transport Ass. compilation

ATA Suggests EPT Alternatives

Rampage asks: Exclude mail pay in tax determination or allow higher return for air transport carriers.

A 5 percent return on invested capital may be enough for a public utility, but it is too strict an excess profit rule for the airlines, the Senate has been told by Robert Rampage, Air Transport Ass. executive vice president.

The House-passed Excess Profits Bill (H.R. 9872) allows airlines, along with railroads and utilities, to earn 5 percent on invested capital before being hit by the 75-percent excess profits rate. It's below the Senate now.

Rampage, of two alternative formulas for airlines:

- Exclude all mail pay from income subject to the excess profits tax.
 - Allow 5 to 10 percent return on invested capital—the rate range that Civil Aeronautics Board usually figures is right for airlines.
- Editor of the ATA-proposed legislation part the Board, in effect, is the airline profit margin. Excluding mail pay means the Board would really set time to decide how much the airlines should earn. Allowing 5 to 10 percent return gives the airlines what CAB usually aims to give them.

► **Millions Chopped**—The "Excess Profits Tax" table above shows the cut that the House's EPT bill would probably take from each airline.

American Airlines and United Air Lines alone would pay more than 53 million additional taxes under such an EPT formula—the cost of three DC-6Bs.

Right now, the airlines have 168 western planes in order at a cost of

\$136 million. These planes, like the 66 airline planes in the Korea airlift today, would be ready at any time.

But, says the ATA in the Senate, "The bill would require us to attempt to finance that development on the basis of a 5 percent return on invested

capital."

Airlines are inhibited by the U. S. for a reason. The Civil Aeronautics Act states it is "to maintain and control the development of air transportation to the extent and in the manner and quality required for the convenience of the United States, the world service, and the national defense."

The act was written in peaceful 1938, just 20 years after World War I ended before the outbreak of World War II. Airline carriers and equipment under that act since then have been inadequate, says Rampage, even without an excess profit tax.

The airlines took such heavy losses after the war that the entire 1946-49 period shows no net profit. Yet 1946-49 average earnings is one of the three bases allowed for computation of the proposed excess profits.

And because the airlines had to buy new equipment at the same time they were losing money, they increased their long-term debt from zero in 1944 to \$172 million in 1948.

The average return of 9.3 percent during the war was not enough to allow the airlines to grow with their own

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Scheduled Lines Investment Return

(Domestic Trunklines)

Year	Income	Investment	Return
1958	\$ 1,813,000 (est)	\$ 50,072,000	3 1/2%
1959	3,682,000	40,394,000	9 1/2%
1960	4,837,000	71,397,000	7 0%
1961	4,185,000	86,656,000	4 6%
1962	14,119,000	72,121,000	11 3%
1963	12,238,000	154,309,000	7 8%
1964	17,480,000	107,713,000	9 0%
1965	21,194,000	240,707,000	5 4%

Let after the war was over. Dangerous jobs.

► **No Redundancy:** The Spherics return to be allowed before excess profits taxes on railroads and utilities does not fit the value picture at all. Railroads pointed out to the Senate Finance Committee that one new train car

► **Activities must show back earnings:** to grow for national defense as well as their commercial markets.

► **Activities are reliable investments:** Railroads cut utilities are older, and do not require substantially. Equipment of utilities and railroads many years before even beginning to enter into the obsolescence category.

► **Lower capital loss of utilities per dol-**

lar of gross revenue makes the use of a single investment more productive. For example, in the case of a railroad and airlines each with an investment of \$1 million, the railroad would do \$150,000 of business annually, whereas the airline would gross \$1 million. Thus, the airline with a \$50,000 net profit under the proposed EPTT law would deserve three times the investment of the railroad would on the same available profits.

Railroads' last plan to the Senate is that if it will not exempt railroads from EPTT, the bill should subtract the CAB recommended investment return for the first 5 percent in the EPTT bill.

case AAA's plans now spread eight side board at the two main spot—Atlanta Newark. No matter how AAA schedules its plans, the long-haul routes at Newark, Philadelphia or Atlantic City.

The only major cost of joining the two terminals—Atlantic City and Newark—would be the station at Atlantic City.

► **Eastern Air:** At the Atlantic City from both LaGuardia and Newark. Eastern will probably object to All American's application to serve the same city from Newark. But any All American, there is already in business. Eastern doesn't touch. And Eastern's DC-3s go to Newark to Atlantic City as a separate service to AAA's proposed DC-3s now stopping at Newark at Atlantic City.

► **ANA:** ANA's service from Atlantic City from Washington, D.C. If HWA has been three intermediate stops while Eastern's run is non-stop or via Baltimore or Baltimore and Wilmington.

► **Frederick Patterson:** All American points out that 45 percent of its business is scheduled, so it helps business a lot.

Right now, All American is sponsoring a joint promotion of air travel to Alaska with Eastern and National Airlines. All American oversees Eastern, Capital, American, Trans World and other airlines using their brochures, posters and coupons.

► **CAB Action:** All American's certificate expires Jan. 11, 1957. The Board

won't and whether it will protect the state applications in such, or will come out with a show-cause order. A Board show-cause order might propose that the certificate be extended with state alternatives and extensions.

On the expiration date only a year off, the Board should come to grips with the All American question, since, at it takes time to study it, schedule hearings.

All American hopes its proposed new contracts and construction will be completed by CAB sooner than a year from now—before AAA's certificate is up for renewal and another summer has gone

by. Any new type of aircraft, such as a light jet, is now type approved and light jet is now type approved. A photo electric light bulb the lights on at dusk and turns them off at dawn.

The airline will get the next business on the same route as the first. The third will go on the same approaching Kingston from Phoenix, Ariz.—on the southwest end of Bismarck's route.

BEA Considers

Internal Routes

(McGraw-Hill World News)

London-British European Airways is considering expanding the sphere of its own and internal routes scheduled for operation in 1960. BEA chief executive Peter Mansfield and his staff have held meetings with private operators interested in extending their services and are looking over some 50 route applications from 21 private companies.

Of these BEA has approved 75 which it will recommend to the Air Transport Advisory Council. The council is approving the majority of the applications for new routes.

BEA, which has allowed private operators to handle services as "associate" as routes at London, is, in fact, not to serve, also plans to discuss with the operators new and means of handling exceptionally high summer traffic.

Bonanza's Beacon

Bonanza Air Lines plans to install three complete flash type beacons along its routes to make night navigation simpler and straighter.

Bonanza has already set up the first such beacon installed by a scheduled airline. It is on Spring Mountain Range, northeast of Las Vegas, Nev. The Civil Aeronautics Administration helped Bonanza make flash type survey flights and has approved the installation.

Light Products, Inc., Beverly Hills, Calif., built the first beacon. Placed on the Reno Las Vegas trip now save time by its use. They no longer need fly a visual descent course.

The beacon is a self-contained, bat-

READY TO GO... **Aircraft**

U-S-S CARILLOY ALLOY STEELS

- 4120 Bonanza, Cessna, Mustang and Mustang II, C-47, C-54, C-55, C-56, C-57, C-58, C-59, C-60, C-61, C-62, C-63, C-64, C-65, C-66, C-67, C-68, C-69, C-70, C-71, C-72, C-73, C-74, C-75, C-76, C-77, C-78, C-79, C-80, C-81, C-82, C-83, C-84, C-85, C-86, C-87, C-88, C-89, C-90, C-91, C-92, C-93, C-94, C-95, C-96, C-97, C-98, C-99, C-100, C-101, C-102, C-103, C-104, C-105, C-106, C-107, C-108, C-109, C-110, C-111, C-112, C-113, C-114, C-115, C-116, C-117, C-118, C-119, C-120, C-121, C-122, C-123, C-124, C-125, C-126, C-127, C-128, C-129, C-130, C-131, C-132, C-133, C-134, C-135, C-136, C-137, C-138, C-139, C-140, C-141, C-142, C-143, C-144, C-145, C-146, C-147, C-148, C-149, C-150, C-151, C-152, C-153, C-154, C-155, C-156, C-157, C-158, C-159, C-160, C-161, C-162, C-163, C-164, C-165, C-166, C-167, C-168, C-169, C-170, C-171, C-172, C-173, C-174, C-175, C-176, C-177, C-178, C-179, C-180, C-181, C-182, C-183, C-184, C-185, C-186, C-187, C-188, C-189, C-190, C-191, C-192, C-193, C-194, 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The diverg gap between the close tolerance of any aircraft fastener. Precision fit. Readily fit in most in surface roughness and dimension of any work.



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S. F. Airport Raises Rates

The San Francisco Public Utilities Commission has approved higher rates and charges at San Francisco Airport over the strong protests of several airlines and oil company representatives.

Not change in rates should cause airport revenues about \$100,000 a year. These are only station rates, however, and the San Francisco Board of Supervisors must approve them before they become official.

The airline and oil men testifying before the commission claimed they were not doing about that that any more than the usual other themselves.

It might mean other airports doing the same thing.

The rate issue is only temporary, as the airport can't know what rates to collect in the future.

Slow-Down At least two of the latest but they had planned expansion of ground facilities at San Francisco Airport, but would not go ahead without knowing their future charges will be. Some of the surface representatives indicated after the hearings that they would rush over to Oakland Airport to see what they could do about increasing revenues there and decreasing them at San Francisco.

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- ✓ **Long-Range Receiver**—For long range, or two radios

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Untying Washington Traffic Knot

More noise and a new report may be the only real solution to Washington's air traffic problem. But several specific ideas are being considered by the Joint Industry-Government Airport Use Committee.

Action—Here are recommendations to untie the Washington traffic problem:

• **Expand** new airport construction. Congress has appropriated \$1 million for land acquisition, but no site has been selected yet. CAA will soon announce selection of a consulting firm to help pick and design the new airport.

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• **Heavy** completion of the new airport traffic control tower by mid-1970.

• **Close** end-of-run runway at Washington National and use it for parking additional planes. This will also cut maintenance costs of that airport.

• **Coordinate** traffic control tower operations at Andrews and Bolling Airports as a single airport traffic control tower.

• **Delay** traffic whenever the controller finds growing congestion necessary. Usually a specific delay period was used in the criteria for initiation of diversion requests.

• **Speed** up testing of airport runway and taxiway markings, and get approved by Washington soon as possible.

• **Get** into use by tower personnel by not requiring them to notify planes about arrivals, or, in diversion, about traffic.

• **Use** more night to control traffic to transfer bulk of passenger type flying to Andrews Field.

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SHORTLINES

• **Air Force**—International carrier is looking for local bases near airports in the French part of Africa. Designed mainly to land planes in the French part of Africa. Designed mainly to land planes in the French part of Africa.

• **Air Line**—Discontinued Air—Union President W. P. Keenan is moving AIAA headquarters to Alexandria, Va. (107 St. Washington St.) last month. Nicholas Edgar J. Stricker of Capital Airlines has been appointed chairman of the General Aviation Committee on Labor of the NSRB.

• **Bureau** Air Line—Federal expects quick CAR decision on its request for extension of the Route-Planets route to Agn and Yarns, Ariz., and El Centro and San Diego, Calif.

• **British** European Airways—European carrier is waiting for a decision. BEA said it reported on Jan. 31st, 1968, that it had received a decision on its request for extension of the Route-Planets route to Agn and Yarns, Ariz., and El Centro and San Diego, Calif.

• **Canadian** Pacific Airlines—Trans-Pacific fleet has four more DC-8s, bought recently in the U.S., but right now they're going to the U.N. Korea route.

• **Capital Airlines**—Carrier made an operating profit of \$193,811 in October, compared with \$125,610 a year ago. Net profit of \$175,634 was on revenues of \$2,905,424. Passenger revenues of \$2,815,130 compare with November's \$1,777,013. Net profit of \$175,634 was on revenues of \$2,905,424. Passenger revenues of \$2,815,130 compare with November's \$1,777,013.

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STRICTLY PERSONAL

METEOROLOGIST: MAN OF SCIENCE

The Weather Bureau recently celebrated its 55th birthday. Sure its humble beginning it had the potential of meteorology to have come a long way. One of the most exciting jobs is that of meteorologist, but a man of interest.

Like for the modern meteorologist is a complex world of millions, whether diagnosis, large cities, countries and the like. He is surrounded by delicate devices that can be found at the local airport, young air or corporate tower—this job is not really understood to be a meteorologist's life.

The task of a meteorologist is a tough, difficult. To know simply that it will be tomorrow is not enough. He must determine the exact hour. He must also know the height of the clouds for any given hour, the velocity and a few other tough things.

One of the basic aspects of his job is that he must know two means of air of different temperatures, the front, where wind had weather zones. Finding the exact location of one of these fronts is sometimes a delicate job. The prediction is that when it will be a second hour in every case, but he is not always right. He is surrounded with all of his equipment and that he was able to forecast in some instances and some other people who will have a hard time in this field.

I was in the state of mind exactly for the meteorologist one night when I stopped at a large airport at Washington National Airport. It was late and a few other tough things, in different places, were coming on the telephone. It took more than 20 minutes at hand working and looking at the way for them to complete their little chat. Except for the sounding in the past, the man was very busy.

DO YOU HAVE A FRONT ON YOUR MAP VERY NEAR WASH. JUST ABOUT 20 MILES NORTHWEST? WILL HAVE IT SOUTH OF QUANTICO

OH, YOU HAVE A DIFFERENT FRONT THAN I HAVE

IS THIS THE ONLY ONE I HAVE

WHAT KIND OF FRONT?

COLD BECOMING STATIONARY INTO WAVE (Showing it will come to a light and come into a wave)

WILL, MAYBE WILL HAPPEN TO DCA (Washington SFC) WINDS IN HALF AN HOUR OR SOONER?

WITH WHAT I HAVE THE WINDS SHOULD GO TO BE (northward) AND NEXT BLOW BACK TO NORTH. THAT WOULD BE A FRONT OR SOME THING PASSING DCA, WITH THE WINDS AT DCA THE WAY THEY ARE NOW I CAN'T SAY HOW FRONTAL IS SOUTH OF US. NO CHANGE IN TEMPERATURE THAT I HAVE NOTICED

I SEE WHERE YOU HAVE YOURS. THERE IS SOME DARK FOR IT, YES, ESPECIALLY THE TEMPERATURE

TEAL, BUT WE HAVE ANOTHER WEAK FRONT THAT IS SOUTHEAST OF DCA AND HAS BEEN CARRIED ALONG AHEAD OF WHAT I CALL THE MAIN FRONT.

SEE, I THINK IT RUNS BETTER NORTH OF DCA TO BETWEEN CIW (Chickadee, W. Va.) AND TRI (Tri-Gal, Va.) AND OVER TO JUST EAST OF BUR (Burg, Va.)

OK, BUT THE AHEAD WE WILL KEEP IT AS IS. GOTTA GO NOW.

THAT WILL MAKE YOU MISS YOUR FEET (foot)

YES, WELL THAT WILL BE THE FIRST TIME

HEY, DON'T YOU THINK THERE IS SOMETHING BETWEEN DCA (Washington, Va.) AND DCA ON THE 600 WEA? (W. Va. and Eastern Standard time further ahead) TAKE A LOOK

WIND SHIFT AND TEMPERATURE DIFFERENCE IT WOULD BE DIFFERENT IF THE FRONT WAS SOUTH OF DCA

THE DIFFERENCE IS DUE TO SOUTHERN HILLS AND ALTITUDE HILLS. WHO'S TALKING ABOUT IT? (Dink)

I DO YOU A BEE THAT DCA WINDS SHIFT TO SOUTH AND CIG (Cloud) GOES TO 100 FEET WITHIN ONE HOUR

PLEASE AN AIRLINE CAPTAIN SAYS HE WAS ON INSTRUMENTS AT 310 FEET

CAN YOU CHECK THAT?

WHAT YOU MEAN? AIRLINES ARE ALWAYS RIGHT.

OK, BUT LET'S GIVE A CHECK ON THE CEILING NOW WE'RE CHECKING

WHAT IS IT?

ABOUT 100 FEET

YOU WIN

All of which had to go into something but I can't figure out what it is. Or can be they mean that it is a meteorologist it will be out.

—R. C. Roberts, AIA

WHAT'S NEW

New Books

Introduction to Helicopter Aerodynamics

by W. Z. Szilagyi, et al.

A straightforward approach to the subject of aerodynamics, this book is a must for all pilots. Author is chief aerodynamicist of Flight Helicopter Corp. and has used for that test the basic material of a series of lectures previously given at the company.

The presentation has a flavor of simplicity, is effectively illustrated with sketches, and mathematical complexity is avoided where possible to enable use with theoretical background of a mechanical engineer to grasp the fundamentals of rotor aerodynamics.

The text begins with a review of aerodynamic fundamentals and progresses through the simple mathematics, blade element, and vortex theories, powerful methods of calculating rotor thrust and power in hovering and vertical flight, performance in hovering, vertical ascent and powered forward flight, and autorotation. A complete list of references and notes are included.

The volume is an useful offering in what is planned to be a complete series of works on rotorcraft with multi-lithed, plastic-bound text covers 158 pages and is priced at \$5.50, plus postage. Publisher: Polytechnic Publishing, P.O. Box 35, Morristown, N.J.

New Publications

A Guide to Air Shipping via the Port of New York

A Guide to Air Shipping via the Port of New York is a booklet of condensed general information for shippers, air traffic managers and exporters and importers. It covers domestic and international routes, rates, regulations, and other information. It is published by the New York-New Jersey Port Authority, Dept. of Airport Development, 131 Eighth Ave., New York 11.

A Study and Appraisal of United Airlines, Inc.

A Study and Appraisal of United Airlines, Inc., is a handsome 46-page report by Selig Aircraft, Aerospace Wings Research Center, and is a valuable resource for anyone interested in the airline industry. It is published by Selig Aircraft, Aerospace Wings Research Center, 1000 E. 1st St., Wichita, Kan. 67201. Price: \$10.00.

Employee Positions in Air Industry

Five new report pointing out the benefits and drawbacks of such schemes. Write: C. A. Macdonald & Associates, Consultants, Inc., 1935 David Clark Building, Detroit 26.

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Air War Forum

(The seventh installment of the following questions to Ben Lee, AVIATION WEEK'S Military Editor, in Washington. We present his answers obtained from official Air Force sources in the Pentagon, which he covers daily—B. H. W.)

Our Jets

Q What disadvantages have been experienced in jet fighters, other than endurance, as contrasted to piston engine fighters?

A None particularly. In fact, the jets have proven quite effective. Because of lack of weight, they make a more flexible gun platform. Maintenance problems of jets are not as great as in piston fighters. With one of the large external fuel tanks the endurance problem is not as operations in Korea are concerned has been eliminated to a great extent. The jet fighters also have obvious advantages of speed, climb and added ability to detect and broadly ground troops against enemy air attack.

Q What is the effect of such engine gun fire on jet engine components (compressors, turbines, and so on) in comparison to the effect of piston engine to piston engine parts? Is there less chance of suffering wear damage to jet engine than to a piston engine?

A Jets are running up surprisingly well. There have been reports of jet fighters coming home with bullet holes in almost every major component—boom, cow, oil system, amplifier blades, tail pipe, etc.

Q What disadvantages have developed with respect to field maintenance of jet aircraft?

A Jet experts have always been aware to work on because of their relatively simple design. This has been carried over into field operations. There are no problems peculiar to the jet type.

Q Has field consumption of jets proven a serious tactical disadvantage?

A Since development of jets, specially modified wing tanks, fuel consumption of jets has caused to be a serious problem in Korea. If fuel could operate less power against a target to be used in field and spread across them as they over the target. Since the 30, Air Force began operating out of South Korean bases, jets have been no problem.

Communist Air

Q What conclusion have been drawn about the MIG-15 by our pilots who have seen it in action? Were any jets salvaged from the MIG-15 shot down on the side of the Yalu?

A The Russians have received some, amount and range in which the MIG is inferior to the F-86 in achieve a little more speed than the F-80. We can obtain no reports of the salvage of any MIG-15 planes.

Q Has any special tactic been necessary to cope with MIG attacks?

A No. Standard tactics have been effective.

Q Is there any indication that Russian jets are now operating from bases in North Korea to the Communist side south?

A No.

Q Approximately how much air support have the Chinese Communists been able to receive in the current campaign?

A There has been no evidence of air support of ground troops by the Chinese. The Chinese planes encountered have been shot against our own aircraft.

Weather

Q The jets have not operations against the enemy are considerably hindered by weather. What has happened to our technique of bombing through an overcast using radar? Is this type of bomb-

ing used only in "strategic" operations, or has it also been used in "tactical support" operations?

A The Air Force at present has no effective means of bombing moving targets from low altitudes by use of radar. Stationary targets can be bombed with some accuracy by this method. USAF is currently working on the problem of ground support by use of radar. Strategic bombing needs by radar consistently as bad weather.

Q How much has weather handicapped the tactical plane operations that were so effective at the beginning of the Korean conflict? What has been done to the extent?

A Except for occasional days of extremely low ceilings and visibility, winter weather has had very little effect on any of our operations in Korea. The seventh air currently averaging between 50 and 60 miles each day involving our enemy strength concentrations.

Night Operations

Q Has the USAF, Navy or Marine had a high percentage of success at night tactical operations?

A Obviously, it is always more difficult to conduct enemy lines of communications in darkness. However, throughout the Korean campaign, night tactical operations using electronic methods and flare drops have been carried out. B-26s are regularly used as night bombers. Bomber pilots drop flares and then spread the targets ahead. Ground forces in the area can then illuminate enemy movements to attack them for air strikes.

B-29s

Q During our interest in Korea why haven't we been making about those B-29s we used earlier in North Korea?

A As the air war moved into high gear, USAF had as the focus on B-29 groups. These were then equipped by "Salamander" of other SAC B-29 groups from the U. S., Alaska, and other Pacific bases. Total B-29 strength six weeks ago was "substantial" at the group. During early stages of war, B-29s were used for all sorts of missions mostly because they were on hand—mainly high level strategic to ground support. As other aircraft moved into the theater, B-29s were withdrawn from "ground support" activity and were assigned to strategic roles. As strategic objectives were reached the necessity of the B-29 diminished. One exception: the last six weeks have been assigned to the U. S. The remaining groups—about three—are averaging about 40 missions a week. Fewest B-29 missions are assigned mostly to attrition.

Special Questions

Q What aircraft moment has been shown most effective against enemy ground troops, machine guns, vehicles, supplies, or bombs?

A Machine guns and machine bombs have proven most effective.

Q Are some aircraft going to Korea? If so, what type?

A Information is classified until plans are in operation in the theater and then previous is apparent to the enemy.

Q During the Pacific phase of World War II, we saw bombing attacks against the Japanese island battles. Have we employed bombing tactics in Korea?

A None have been reported.

Q Everybody has been talking about the A Bomb, but nobody mentions any more. If the bomb had to be made, what would be its major effect?

A No comment. However, no indication is presently forthcoming by the Geneva convention.



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WITHIN a short time the first American commercial airliner powered by turbine engines will be delivered to the Allison Division of General Motors.

The power plants in this Convair are the new Allison Model "501" Turbo-Props—commercial version of the Navy T38 engine. They are geared to new-type propellers especially designed and built for high-engine-power characteristics by the AeroProducts Division of General Motors.

The "501" is lighter, smaller, smoother and quieter than any other propeller-type engine of equal horsepower. It develops 2,750 horsepower and weighs only 1,250 pounds!

As soon as this experimental Turbo-

Prop transport is received, General Motors-Allison engineers will start putting it through a comprehensive series of flight tests.

In cooperation with the airlines it will be flown under all types of operating conditions—in all kinds of weather. It will be given the works, checked and rechecked many times over, until all its performance characteristics are definitely evaluated.

Such an all-out test program may take a year or more. But it will be well worth it, in view of the fact that present military experience indicates that Turbo-Prop power should bring the following benefits to commercial aviation:

Smoother, quieter operation—for more comfortable travel; also lower maintenance and overhaul costs.

Ability to use low-cost, low-octane fuels, without increased consumption.

Faster speed—up to maximum limit permitted by airframe design.

Very low engine weight—less than half—increasing range or pay load.

Much improved take-off and climb—permitting use of shorter runways, with greater safety and better schedules.

Usable in present aircraft—no costly modifications in changing over to turbine power.

When General Motors is satisfied with its tests of these engines and they are approved for commercial use by the C.A.A., it will be possible to convert present airliners to smoother turbine power without further delay—giving America very high-speed, low-cost, regular airline service.

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